<u>What is claimed is:</u>

1.   A digital feedback linearizing apparatus to linearize a power amplifier used in a mobile communication base station, the digital feedback linearizing apparatus comprising:

5   a power amplifier input/output signal subtracting means, which generates a difference between an input signal and an output signal of the power amplifier;

an inverse distorted feedback signal extracting means, which extracts an inverse distorted feedback signal (e(t)) corresponding to an input signal (x(t)) input to the digital feedback linearizing apparatus through a predetermined path based on the

10   output signal of the power amplifier input/output signal subtracting means and the input signal (x(t)); and

a signal adding means, which generates a predistorted signal (u(t)) input to the power amplifier by adding the inverse distorted feedback signal (e(t)) to the input signal (x(t)),

15   wherein the power amplifier linearizes the power amplifier using the predistorted signal (u(t)) as its input signal.

2.   The digital feedback linearizing apparatus of claim 1, wherein the inverse distorted feedback signal extracting means comprises a look-up table

20   composed of signal values that are quantized corresponding to the amplitude of the input signal (x(t)), which gradually increases by a predetermined unit.

3.   The digital feedback linearizing apparatus of claim 1, wherein the power amplifier input/output signal subtracting means, the inverse distorted feedback signal

25   extracting means, and the signal adding means are included in a digital signal processor.

4.   The digital feedback linearizing apparatus of claim 1, further comprising an output signal offset means that is interposed between an output terminal of the

30   power amplifier and the power amplifier input/output signal subtracting means and controls the amplitude of the output signal of the power amplifier.

5.   The digital feedback linearizing apparatus of claim 4, wherein the output signal offset means offsets the amplitude of the output signal of the power amplifier by

the reciprocal of the total gain.

6.   The digital feedback linearizing apparatus of claim 1, wherein a gain (Gu) when the predistorted signal (u(t)) is fed back and added to the input signal (x(t)) approximates 1.

7.   A digital feedback linearizing apparatus to linearize a power amplifier used in a mobile communication base station, the digital feedback linearizing apparatus comprising:

a look-up table composed of signal values that are quantized corresponding to the amplitude of the absolute value of an input signal (x(t)) input to the digital feedback linearizing apparatus;

a feedback output reference signal selecting means, which selects a feedback output reference signal ($y_r(t)$) relating to an output signal fed back from the power amplifier from the look-up table; and

a signal adding means, which generates an error signal ($x_e(t)$) input to the power amplifier by adding the feedback output reference signal ($y_r(t)$) to the input signal (x(t)),

wherein the power amplifier linearizes the power amplifier using the error signal ($x_e(t)$) as its input signal.

8.   The digital feedback linearizing apparatus of claim 7, further comprising an output signal offset means that controls the amplitude of an output signal of the power amplifier and offsets the amplitude of the output signal of the power amplifier by the reciprocal of the total gain of the digital feedback linearizing apparatus.

9.   The digital feedback linearizing apparatus of claim 7, wherein when the gain of the power amplifier is A, a distortion component caused by the power amplifier is d(t), a degree of offset caused by feedback is 1/K, and the output signal of the power amplifier is y(t), the following equation is established:

$$y(t) = A \bullet x_e(t) + d(t)$$

$$y_r(t) = \frac{y(t)}{K}$$

$$x_e(t) = x(t) - y_r(t).$$

10.   A digital feedback linearizing method implemented by a linearizing apparatus to linearize a power amplifier used in a mobile communication base station, the digital feedback linearizing method comprising:

(a) generating a difference between an input signal and an output signal of the power amplifier;

(b) extracting an inverse distorted feedback signal $(e(t))$ based on the difference generated in step (a) and an absolute value of an input signal $(x(t))$ input to the linearizing apparatus through a predetermined path;

(c) generating a predistorted signal $(u(t))$ input to the power amplifier by adding the inverse distorted feedback signal $(e(t))$ to the input signal $(x(t))$; and

(d) linearizing the power amplifier using the predistorted signal $(u(t))$ as an input signal of the power amplifier.

11.   The digital feedback linearizing method of claim 10, wherein step (b) comprises structuring the look-up table composed of signal values that are quantized corresponding to the amplitude of the input signal $(x(t))$, which gradually increases by a predetermined unit, and extracting the inverse distorted feedback signal $(e(t))$ from the look-up table.

12.   A digital feedback linearizing method implemented by a linearizing apparatus to linearize a power amplifier used in a mobile communication base station, the digital feedback linearizing method comprising:

structuring a look-up table composed of signal values quantized corresponding to the amplitude of an absolute value of an input signal $(x(t))$ input to the linearizing apparatus;

selecting a feedback output reference signal $(y_r(t))$ relating to an output signal fed back from the power amplifier from the look-up table;

generating an error signal $(x_e(t))$ input to the power amplifier by adding the feedback output reference signal $(y_r(t))$ to the input signal $(x(t))$; and

linearizing the power amplifier by using the error signal $(x_e(t))$ as an input signal of the power amplifier.